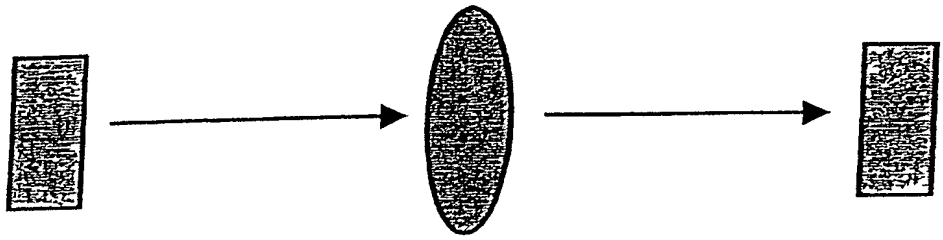
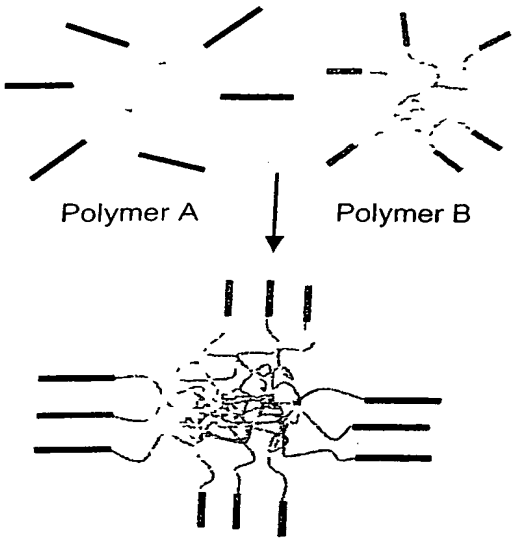
Figure 1



permanente Form	Permanent shape
temporäre Form	Temporary shape
Programmierung	Programming
Wiederherstellung	Restoration

Schematic diagram of the shape-memory effect. A polymer material is transferred from the permanent to the temporary shape by programming. The permanent shape is restored by an external stimulus.

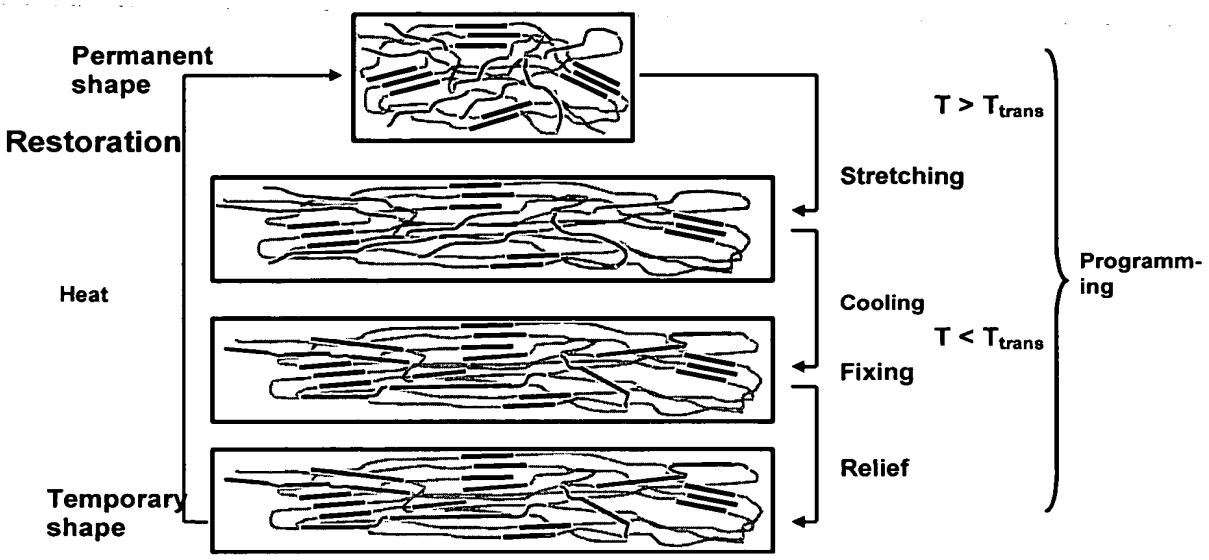
Figure 2



Polymer blend

Schematic representation of the polymer blends with thermally induced shape-memory effect. Polymer A is formed from an amorphous soft segment (·····) and a partially crystalline hard segment (------) with the melting temperature T_{m1}, polymer B contains the same amorphous soft segment (·····) and a partially crystalline hard segment (------) with $T_{m2} < T_{m1}$, which acts as switching segment in the shape-memory effect.

Figure 3



Schematic representation of the shape-memory effect of the polymer blends; the transition temperature T_{trans} is the melting temperature T_m of the partially crystalline switching segment. At temperatures above T_{trans} the segments are soft and flexible (~) and the material can be elastically deformed. If the temperature is reduced below T_{trans}, then these segments become partially crystalline and hard (~——), the temporary shape of the material is fixed. For the permanent physical linking (-----) is used, the T_m of which lies above T_{trans}. The third component, (——), contributes to the elasticity of the materials.

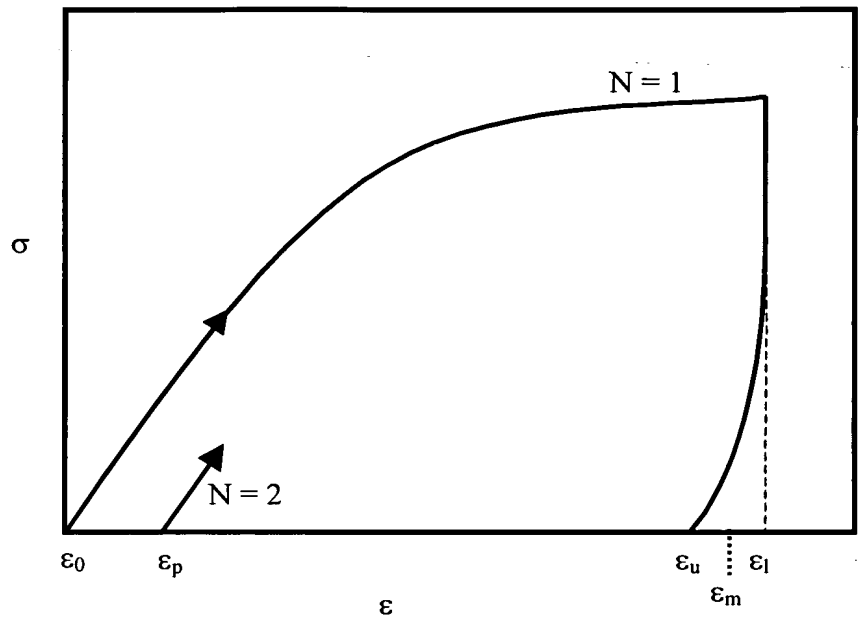


Fig.1: Schematic representation of a strain-controlled, cyclical, thermo-mechanical tensile strain experiment. The sample is fixed at maximum strain ε_m at T_l and the shape is restored in the relaxed state at T_h.

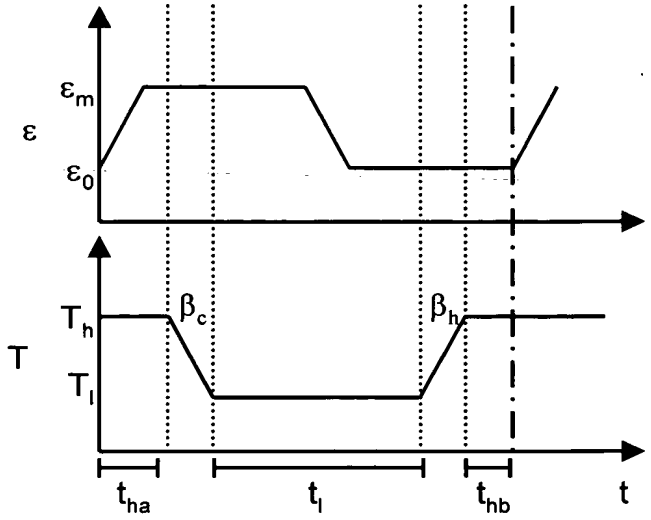


Fig. 2: Schematic representation of the principle of the strain-controlled thermo-mechanical cycle. The change of the temperature from T_h to T_l and from T_l to T_h is indicated with a dotted line (.....). The last vertical line (- - -) identifies the end of the first cycle.

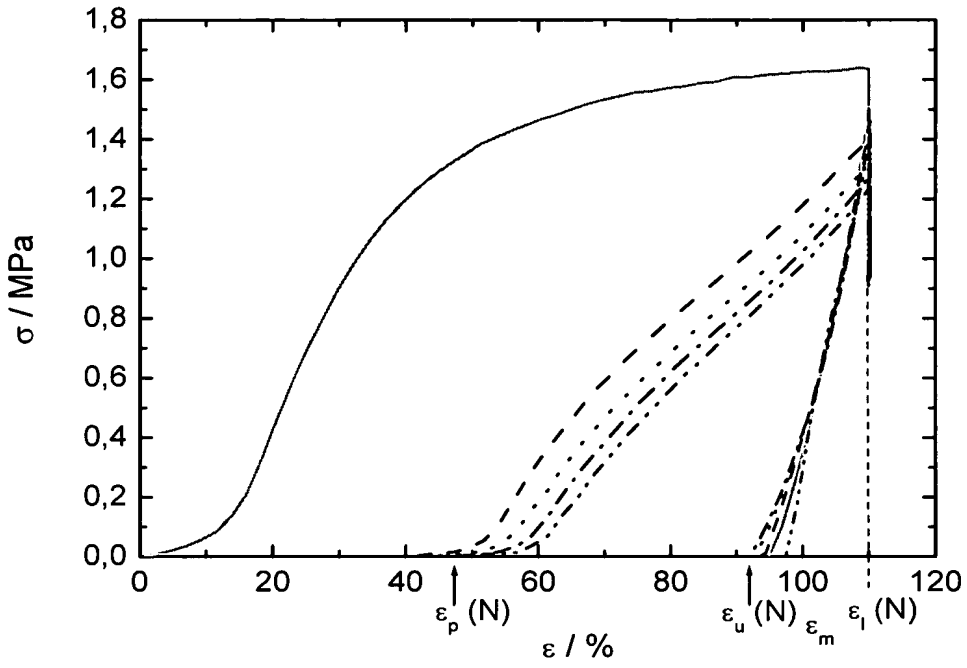


Fig. 3: Illustration of a strain-controlled, cyclical, thermo-mechanical tensile strain experiment with an example of the polymer blend PDA(50) / PCA(47)[22/28] at T_h = 50°C, T_l = 0°C and ε_m = 100%.

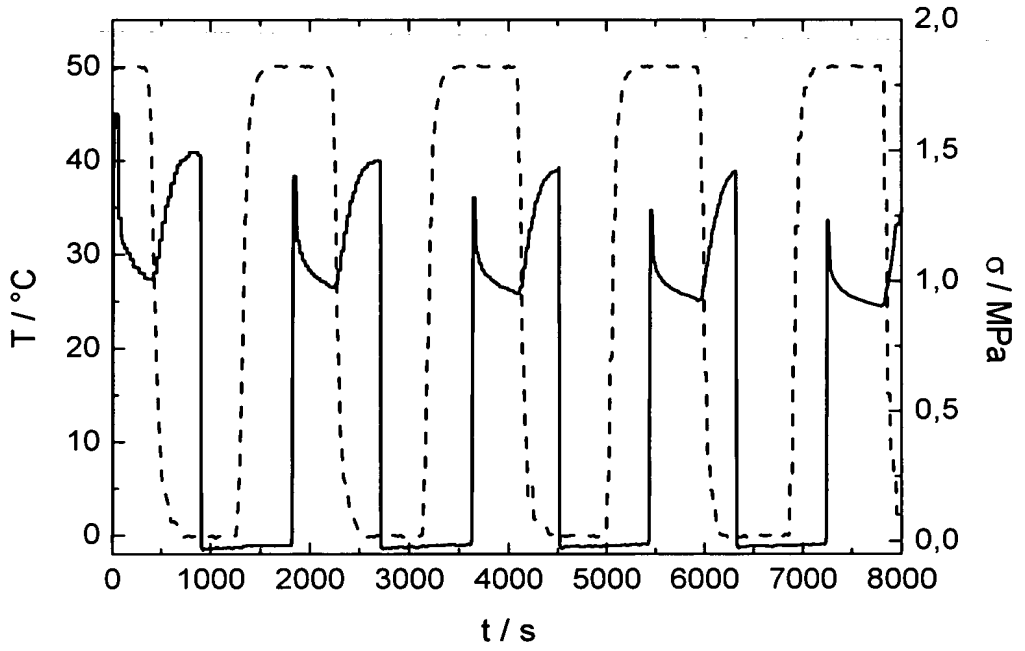


Fig. 4: Temperature T (---) and stress σ (-) in dependence of time during a strain-controlled, cyclical, thermo-mechanical cycle for an example of the polymer blend PDA(50) / PCA(47)[22/28].

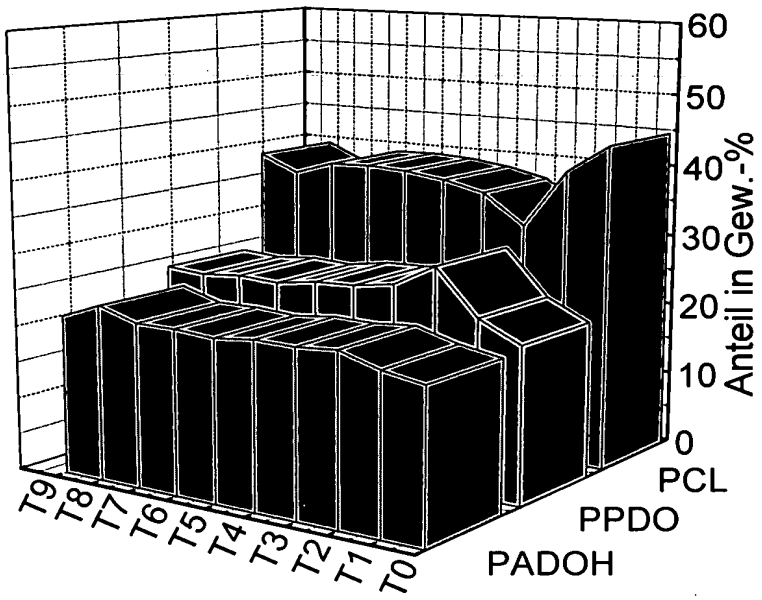


Fig. 5: Composition of the extruded polymer blend PDA(42) / PCA(68)[23/40] in dependence of the dwell time in extruder during the second extrusion. T0 gives the composition at the beginning of the 2nd extrusion, T1 to T8 describe the compositions of the billet at a spacing of 70 cm and T9 gives the composition of the end of the last piece of billet.

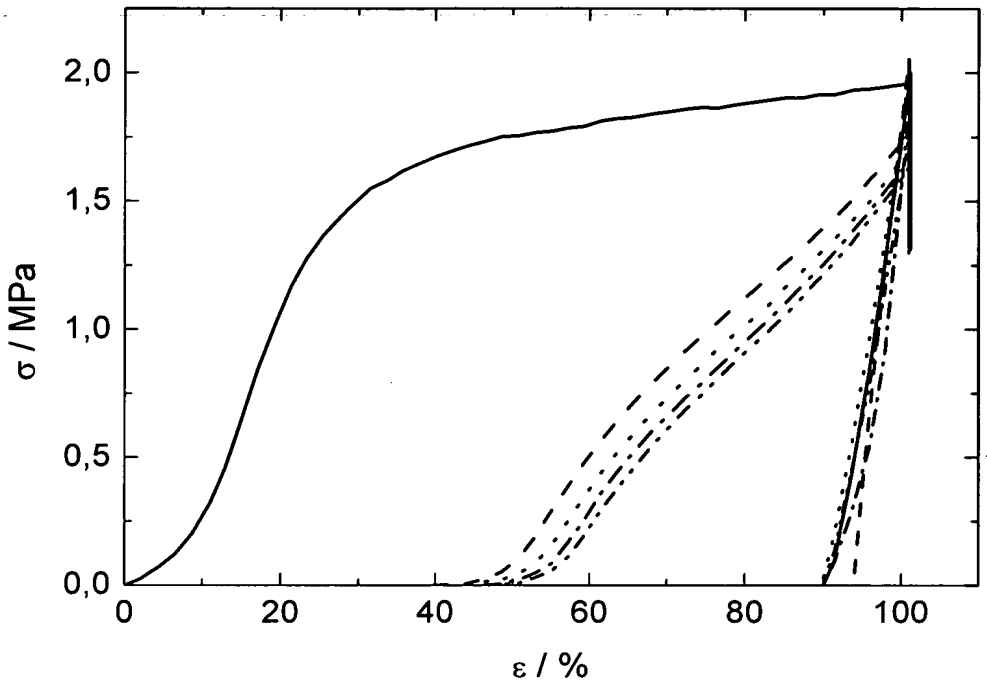


Fig. 6: Illustration of a strain-controlled, cyclical, thermo-mechanical tensile strain experiment with an example of the extruded polymer blend PDA(50) / PCA(68)[30/27] at T_h = 50°C, T_l = 0°C and ε_m = 100%.